

10/500248
AMENDMENTS TO THE CLAIMS DT04 Rec'd PCT/PTO 25 JUN 2004

1. (Currently amended) A steerable nozzle for a rocket engine comprising: a casing ~~(10)~~ surrounding a combustion chamber ~~(12)~~ and having a rear end wall ~~(14)~~; a nozzle comprising a moving diverging portion ~~(20)~~ and a static portion ~~(16)~~ secured to the rear end wall; a jointed link device connecting the moving diverging portion of the nozzle to the static portion, the moving diverging portion and the static portion being in mutual contact via respective spherical surfaces ~~(24a, 16a)~~; and an actuator device ~~(50a, 50b)~~ acting on the moving diverging portion of the nozzle to enable the direction of the thrust vector of the engine to be varied by modifying the orientation of the nozzle with the spherical surfaces sliding one on the other; and

~~the nozzle being characterized in that resilient return means (62, 64) are interposed between the moving diverging portion (20) of the nozzle and the static portion (16), said resilient return means acting on the moving diverging portion to urge it towards the static portion so as to keep the spherical surfaces (24a, 16a) in mutual contact for any desired orientation of the nozzle.~~

2. (Currently amended) A nozzle according to claim 1, in which the link device is a cardan mount comprising a ring ~~(30)~~, two first link arms ~~(32, 34)~~ connecting the moving diverging portion ~~(20)~~ of the nozzle to the ring via two first hinges ~~(36, 38)~~, and two second link arms ~~(42, 44)~~ connecting the ring ~~(30)~~ to the rear end wall ~~(14)~~ of the casing via two second hinges

~~(46, 48)~~, the nozzle being characterized in that wherein the resilient return means ~~(62, 64)~~ are integrated in link arms.

3. (Currently amended) A nozzle according to claim 2, characterized in that wherein the resilient return means ~~(62, 64)~~ are integrated in the first link arms ~~(32, 34)~~.

4. (Currently amended) A nozzle according to ~~any one of~~ claims 1 ~~to 3~~, characterized in that wherein the resilient return means ~~are constituted by~~ comprise prestressed springs ~~(62, 64)~~.

5. (Currently amended) A nozzle according to claim 1 ~~or claim~~ 2, characterized in that wherein the resilient return means are constituted at least in part by an elastically deformable part of the link device which is elastically deformed on assembly.

6. (Currently amended) A nozzle according to claims 2 ~~and 5~~, characterized in that ~~the elastically deformable part is the~~ wherein said resilient return means are constituted at least in part by said ring of the cardan mount which is elastically deformable and is elastically deformed on assembly.

7. (Currently amended) A nozzle according to ~~any one of~~ claims 1 ~~to 6~~, characterized in that wherein anti-friction means are ~~present~~ provided between the spherical surfaces in mutual contact.

8. (Currently amended) A nozzle according to claim 7, ~~characterized in that~~ wherein the anti-friction means ~~are constituted by~~ comprise a lubricant.

9. (Currently amended) A nozzle according to claim 8, ~~characterized in that~~ wherein the lubricant is a graphite grease.

10. (Currently amended) A nozzle according to claim 7, ~~characterized in that~~ wherein the anti-friction means ~~are constituted by~~ comprise a coating or ~~by an~~ interface part in the zone of contact between the spherical surfaces.

11. (Currently amended) A nozzle according to ~~any one of~~ claims ~~1 to 10~~, in which the link device is a cardan mount having two pivot axes, ~~the nozzle being characterized in that~~ and the actuator device comprises rotary actuators positioned on the cardan axes in order to steer said axes directly.

12. (New) A steerable nozzle for a rocket engine comprising:
a casing surrounding a combustion chamber and having a rear end wall;

a nozzle comprising a moving diverging portion and a static portion secured to the rear end wall; a cardan mount connecting the moving diverging portion of the nozzle to the static portion, the moving diverging portion and the static portion being in mutual contact via respective spherical surfaces, the cardan mount comprising a ring, two first link arms connecting the moving diverging portion of the nozzle to the ring via two

first hinges, and two second link arms connecting the ring to the rear end wall of the casing via two second hinges;

an actuator device acting on the moving diverging portion of the nozzle to enable the direction of the thrust vector of the engine to be varied by modifying the orientation of the nozzle with the spherical surfaces sliding one on the other; and

resilient return means integrated in link arms of said cardan mount and acting on the moving diverging portion to urge it towards the static portion so as to keep the spherical surfaces in mutual contact for any desired orientation of the nozzle.

13. (New) A steerable nozzle for a rocket engine comprising:

a casing surrounding a combustion chamber and having a rear end wall;

a nozzle comprising a moving diverging portion and a static portion secured to the rear end wall;

a cardan mount connecting the moving diverging portion of the nozzle to the static portion, the moving diverging portion and the static portion being in mutual contact via respective spherical surfaces; and

an actuator device acting on the moving diverging portion of the nozzle to enable the direction of the thrust vector of the engine to be varied by modifying the orientation of the nozzle with the spherical surfaces sliding one on the other;

said ring of the cardan mount being elastically deformed on assembly to act on the moving diverging portion to urge it towards the static portion so as to keep the spherical surfaces in mutual contact for any desired orientation of the nozzle.